/7 cont./

242 this estimate. Through repeated tests he finds out the type of the soil and draws the necessary conclusions. As a rule, he proceeds as follows: with the machete, he digs a hole and examines the soil.
[823] By crumbling it between his fingers, he finds out its quality by touch. He distinguishes three types: sandy, clayey, and black, allowing for certain variants and intermediary types, according to the composition and percentage of clay or sand. He makes these soil tests at various depths and in various places when he suspects that only a thin layer is involved, or to find out how far /the layer/ extends. The type of garden also depends on the type of the soil; in other terms: depending on what he wishes to plant, he has to choose a /specific/ type of soil. For this reason, in his hunting forays through the forest, the Indian pays attention to the ground through which he passes in order to find out where he will find appropriate soil when he needs it. The following rule applies as a general norm:

242 134 sandy soil: good only for bitter manioc; inadequate for other plants.

clayey soil: good especially for bitter manioc, tubercles in general, and also for banana plantations; other plants do not grow well in this soil.

[245]

black soil: good for everything. For this reason, black soil is always sought out and preferred. This is the tobacco ground par excellence.

[249]

*241 2. Size and shape of the plot. As was already partly explained, the size of the plot depends on the quality of the soil. If /the Indian/ [242] finds the chosen soil somewhat weak, he figures out beforehand that the harvest will be less satisfactory, and makes the plot somewhat larger. From the practice he has acquired since youth, he empirically figures out the area that will be needed. To do this he does not use measurements, as our peasants do ("braças," "varas," and such).
[804] I attempted in various ways to find out how the Munduruků figures out the size of the plot he is about to prepare. The answers were always the same: "... just by looking, you already know ..." /8/ or "... just by looking...." If the family has grown through the years,

*241 /11 cont./
does the turn of the tubercles come. In general outline, the planting sequence (although it is not always strictly observed) is as follows:

a) Optional cultivation of watermelon (and pumpkins as well?)
b) Planting or set cultivation of:
   1. bitter manioc
   2. yams
   3. sugar cane
   4. pineapple

/12/ /Figure 1 appears here./

   5. timbo vine
   6. rice
   7. maize
   8. beans, pumpkins, etc.

Other plants such as sweet manioc, caladium, pepper, etc., are fitted into the corners of the plot, or on the sides, depending on the possibilities and circumstances. Anyhow, it should be noted that tubercles, especially bitter-manioc roots and yams, are in the center of the garden, while other cultivated plants which are not tubercles are placed around it. Yams and manioc roots are planted in alternate spots, checkerboard fashion. Sweet manioc, sweet /13/ /Figure 2 appears here/ potatoes, and caladium, on the other hand, are planted together and are not ordinarily mixed with other cultivated plants. Tomé, one of my informants, drew me the sketch outline of a garden. The numbers on it refer to those mentioned above in the planting sequence.

In connection with this agricultural system, it is also well to mention cultivated plants in general. A distinction must be made between plants which are cultivated in the garden proper, and other
•[245] plants, especially fruit-bearing ones, /which are cultivated/ outside it, in fallow plots, around the houses, at canoe landings, or at other much frequented or easily accessible spots. The first category includes /14/ agricultural plants proper; the second involves some incipient fruit growing, even though on a very rudimentary level. It should also be mentioned that for nearly all the plants they cultivate, the Munduruků are familiar with several varieties which they differentiate easily. A list of these varieties, with respective native and scientific names, is given in the last part of this work.

/18 cont./

241 10. Replanting—yabi kudn or warabm yup maum. Once the garden has been torn up, that is, when the harvest is completed, the plot is abandoned and lies fallow. When the soil is very good, a replanting is attempted. The ground is again weeded and cleaned, and if the need exists, the refuse of the field—branches or small shrubs—are burned. The new planting is done. This replanting process is also used in urgent cases, when the Indian is unable because of illness or some other circumstance to prepare a new plot. When a replanting is done with the sole purpose of taking advantage of the soil, a new plot is almost invariably cleared, although it is small and sometimes adjacent, merely enlarging the old one. The [242] Indian knows perfectly well that the yield of a replanting is much smaller than that of a new garden. Because of this, he must supply the portion which the replanted ground will fail to produce. Fre- [245] quently, the fallow or newly torn-up field is used merely to plant banana trees, if the soil is appropriate.

Nowadays, gardens are indispensable to the Munduruku's existence. He is still a hunter, a fisherman, and a gatherer of wild fruit. But without the gardens, he could not survive. He himself would regard as absurd the thought of subsisting merely on hunting and gathering. He knows how to utilize his gardens and the plants he cultivates, extracting from them a series of by-products which contribute to his subsistence. (10)

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10. It is rather interesting to compare the native agricultural methods with those of the peasants on the lower Amazon. Wagley, in his study of "Uma comunidade amazônica /An Amazonian Community/" (1957: 100 pp.), describes, in more general terms, the same procedure of garden clearing, planting, and cultivation, in short, of horticulture, among